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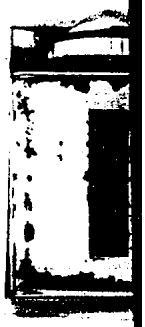

COMMENTS ON METHODS OF CHARGING CZECHOSLOVAK BLAST FURNACES

[Comment: This report summarizes an article by Engineer S. Cernoch of the Metallurgical Planning Office (Hutni projekt) in Trinec, in which he replies to comments made on a lecture he gave at the First Czechoslovak Conference of Blast-Furnace Workers in Prague, the date of which was not given. The article was published in the April 1954 issue of Hutnicke Listy, organ of the Czechoslovak Ministry of Metallurgy and Ore Mines.]

Since I had no time to reply to the comments by Engineer Jaroslav Vesely from the Metallurgical Planning Office in Vitkovice, made on the occasion of my lecture at the First Czechoslovak Conference of Blast-Furnace Workers in Prague, I would like to take this opportunity to reply.

In the first part of his discussion, Engineer Vesely attempted to explain why the method of charging blast furnaces by using conveyer belts had not been widely adopted.

He begins with the contention that the grading bunker designed for the "Zelena Louka" Plant would be circular, much like the ones in Tisovec, and would present difficulties in operation. This opinion, however, is quite erroneous and leads to errors in most all of his subsequent conclusions.

After some modification, a circular bunker was used in Tisovec by using parts of the existing ore-storage facility; in other words, for reasons of economy.

In planning a new metallurgical project, as has been documented by Soviet experiences, or in expanding existing facilities by adding an additional blast furnace, a grading bunker can be arranged advantageously near the ore bridge; that is, on the same line, with the blast furnaces and the ore pile. The handling of raw materials for the furnace up to as far, as the grading bunkers would then be the same as now, and perhaps, for the sake of homogeneity, an even better method could be worked out.

It is known that rubber conveyer belts will not withstand temperatures above 100-150 degrees centrigrade, whereas a skip hoist can withstand higher temperatures. On the other hand, cooling of sintered products below this temperature limit is possible. Various solutions of this problem are known throughout the world. Some of them have even been proven in Czechoslovakia (for example, the "Aumund" belt).

The use of a skip hoist also permits less waste of a prepared product than does the rubber conveyer belt.

In charging the blast furnace with a conveyer belt, the bridge of the belt would not be mounted at right angles to the axis of the blast furnace, like the bridge of the skip hoist; it would be mounted at an angle, so as to permit the furnace to be placed either at the same distance or further away from the ore pile than is the case today.

My lecture compares the cost of the skip hoist and the conveyer belt systems. I have shown that the steel structure for three conveyer belts for three furnaces at Trinec is lighter than the steel structure for one skip hoist for a single furnace. Using as a criterion the number of cubic meters of furnace charge equated against the number of tons of steel required for the structure, we can see that this system is by far the

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cheapest ever to be used in Czechoslovakia. The above comparison is not quite complete. It has only compared the cost of the steel bridge structures (and not the cost of the rubber conveyer belt and its simple drive mechanism) to the cost of the skip hoist (skips, cables, winches, hoisting mechanism, and buildings required to operate it). Even if this comparison were completed, the belt would prove cheaper.

Despite the fact that Czechoslovakia has both skip hoist and conveyer methods of charging blast furnaces in operation today in Trinec and Kuncice, a comparison of the maintenance costs of each has not yet been made. This is due to the fact that both locations suffered needless stoppages, caused by faulty maintenance or negligent operation. All over the world, the use of rubber conveyer belts is supplanting conventional methods of transporting bulk materials, such as skip hoists, cable cars, bucket elevators, etc., particularly in cases where large quantities of bulk cargo have to be moved.

In another part of his discussion, Engineer Vesely himself suggests a further use for the rubber conveyer belt. This use is most certainly desirable from a maintenance and operational viewpoint. Development has shown the conveyer belt to be desirable from the viewpoint of operation, maintenance, safety, low cost, investment cost, etc., in most instances, but primarily only in cases involving the movement of bulk materials above certain minimum quantities. The ever-increasing use of belts in metallurgical enterprises tends to document the above contention.

I believe that the main explanation as to why the belt system was not introduced until recently rests in its relative newness as compared to existing methods of transportation. The rubber conveyer belt as a transportation medium is only several decades old, whereas the skip hoist, or an elevator with a steel guard, has been in use for several centuries [sic]. The rubber conveyer belt was not introduced in Czechoslovak metallurgical enterprises until sometime in the 1930s.

The idea of using a rubber conveyer belt to charge blast furnaces surely was contemplated, in more places than the Trinec planners are willing to admit. In the words of Engineer Mikhailovich of the USSR, who was a recent guest in Czechoslovakia, "Many have tried to solve this problem throughout the world." Undoubtedly, Czechoslovakia should get the credit for the first successful design, execution, and operation of a new type of charging procedure which permits better control of the furnaces than any existing thus far.

This particular phase of the design, and its advantages, were thus far clearly realized only by a few Czechoslovak specialists. After observing the system in operation at the Trinec blast furnaces, an outstanding Soviet specialist stated that use of belt conveyers facilitated better control of the furnaces than had been possible in the USSR and elsewhere, where the conventional type of McKee charging system is used. Thus, the Soviet expert fully supported the advantages of the new Czechoslovak design.

Belt charging was introduced on five blast furnaces in Belgium; however, the McKee system was used, with its more complicated electrical system and the less orderly division of material, rather than the system suggested by the author. During the past 6 months, the description and evaluation of the Belgian system has been published in most of the world's trade journals.

Engineer Vesely also failed to mention wages. A modern blast furnace with the best mechanical equipment requires a three-man crew per shift. Conveyer belt charging permits fully automatic operation, as outlined in the

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Tisovec plans. Only one supervisor is needed, saving the wages of six or more men per day per furnace. It is not practical to automate fully a skip hoist and a weighing truck. The chief advantage of our system of belt charging is that it facilitates a more regular operation of the furnace, results in more efficient output, and permits better control of the furnace by the charging shop through the use of a more uniform charge.

Engineer Vesely's explanations are, therefore, either based on erroneous assumptions, or they are insufficiently documented. His evaluation [of my lectuce] is incomplete. That is to say, decisive advantages are not emphasized, so that his evaluation has the appearance, like so many preceeding evaluations, of being extremely one-sided.

I believe that an automatic furnace with a thin-walled shaft, an automatic charging system utilizing electronically controlled conveyer belts, and a charging shop like that erected at Trinec, would place Czechoslovak blast furnace installations at the head of world development in this field.

Full development and perfection of this original Czechoslovak concept depends primarily on Czechoslovak operations and planning.

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